

STS-107 Flight Readiness Review Minutes

The STS-107 Flight Readiness Review convened at 10:30 a.m. on January 9, 2003, in the Mission Briefing Room at the Kennedy Space Center. The meeting was chaired by W. Readdy, Associate Administrator, Office of Space Flight.

Flight Crew, Ferry Readiness, and DDMS did not have any issues or constraints to flight and did not make formal presentations. Readiness statements were included in the backup package.

The presenters were:

Mission Operations - P. Engelauf (NASA/JSC/DA8)
K. Beck (NASA/JSC/DA8)
T. Sobchak (NASA/GSFC/450)
S. Hartwig (USA/Houston/USH-400A)
Extra Vehicular Activity - A. Flynt (NASA/JSC/XA)
G. Lutz (NASA/JSC/XA)
Space and Life Sciences – S. Pool (NASA/JSC/SA12)
Program Integration - V. Ellerbe (NASA/JSC/MA2)
R. Wallace (NASA/JSC/MS2)
Payload Processing - J. Kiefenheim (NASA/KSC/UB-E2)
External Tank - T. Greenwood (NASA/MSFC/MP31)
Reusable Solid Rocket Motor - T. Boardman (Thiokol/Utah/ Thiokol/Utah/L00)
Solid Rocket Booster - R. Elliot (USA/KSC/USK-417)
Space Shuttle Main Engine - D. Adamski (Rocketdyne/Canoga Park/055-AC82)
Vehicle Engineering - D. White (USA/Houston/USH-601M)
D. Rigby (Boeing/Houston/HZ1-10)
Shuttle Processing - J. Taylor (USA/KSC/USK-217)
M. Young (USA/KSC/USK-459)
J. Guidi (NASA/KSC/PH)
Eastern Range - M. Gawel (45RANS/PAFB/DOS)
Safety Reliability & Quality Assurance - M. Erminger (NASA/JSC/MQ)

Mission Operations

STS-107 is an international research mission carrying the FREESTAR payload and double module SPACEHAB. This mission features a highly integrated timeline with dual shift operations, approximately 250 attitude maneuvers, and 300 science critical periods driven by command, data, and video requirements. The vehicle will be equipped with an Extended Duration Orbiter pallet, which has not flown since STS-90 in 1990. A new flight rule may allow trans-Atlantic landing rain shower exceptions if a new Spanish weather radar with detailed data is available.

Extra Vehicular Activity (EVA)

There is no scheduled EVA requirement, though two suits are on-board for contingencies. A special topic regarding a frayed bio-med cable (STS-113) was discussed. This issue is no constraint to STS-107, but possible workmanship and process escape concerns are still being worked.

Space and Life Sciences

Status was presented on crew health, exercise countermeasures, Shuttle water quality, and radiation exposure levels.

Program Integration

A 16-day mission has been baselined. The mission will consist of 30 microgravity, space, and life sciences payloads in the SPACHAB, 6 experiments in FREESTAR, and one experiment sponsored by the Department of Defense. Five payloads will need refurbishment after two launch attempts. The waiver concerning the STS-112 pyrotechnic system failure at T-0 has been extended to include STS-107 since the hazard reports were not yet updated prior to the Flight Readiness Review.

Payload Processing

Open work, pad stow schedules, mid-deck experiment requirements, and launch scrub refurbishment schedules were discussed. An exception was approved to allow disconnection of the Biopack data cable in case of damage.

External Tank

This is the first lightweight tank to fly with three Block II engines, which require higher pressures for liquid hydrogen tank pre-pressurization. Analysis showed that critical structural margins of safety are unaffected by the higher pressures. One mission specific assessment was discussed concerning the gaseous oxygen ullage pressure prediction possibly exceeding interface control document limits.

Reusable Solid Rocket Motor

A plug washer in the right aft dome 120-degree radial bolt hole and flashing on the nozzle-to-case joint packing discovered during STS-113 booster disassembly were discussed. However, no flight concerns for STS-107 were identified.

Solid Rocket Booster

This is the first flight of forward and aft separation bolts supplied by a new vendor. A technical issue involving defective cable connector sockets was reviewed. STS-107 has been inspected and is safe to fly. Suspect paint chip foreign object debris in booster separation motor propellant has been cleared as a constraint based on testing and analysis.

Space Shuttle Main Engine

Major components, ignition margins, predicted performance, and redline margins were presented. A small area of hydrogen flame observed in STS-113 launch videos on main engine #1 cold wall was assessed. This event was found to be within specification for hydrogen leakage and well below levels necessary to negatively impact engine performance.

Vehicle Engineering

STS-113 and OV-102 last-flight anomalies (including high oxygen concentrations in the mid-body due to oxygen supply flex line damage, right orbital maneuvering engine (OMS) bi-propellant valve #2 indicating open, remote manipulator system wrist roll sluggish joint response, freon coolant loop #1 degraded aft cold plate flow, airlock A-hatch locking actuator problem, liquid hydrogen 4-inch recirculation disconnect slow-to-close, flash evaporator system accumulator/hi-load heater failure, reaction control system (RCS) thruster failures, and EVA maneuvering unit water leak) have been addressed and closed. Critical process changes include enhanced/advanced master events controller acceptance test modifications and OMS/RCS crossfeed line heater wraps. A total of 18 modifications were implemented during the STS-107 processing flow. A new system control module and two advanced master events controllers will be flying for the first time on STS-107. Cracks in the hydrogen feedline CRES 321 flow liner have been welded, slots polished, and cavity clean-up completed. All repairs have been certified for flight.

Cracks discovered in the OV-103 17-inch liquid oxygen feedline ball strut tie rod assembly (BSTRA) ball constrains the launch of STS-107. Failure of the ball could result in lack of articulation capability and/or the generation of foreign object debris (FOD) in a cryogenic system. Flight rationale will be based on resolution of two issues: joint performance with cracked balls and presence of FOD. Additional testing is required to support flight rationale. The exception submitted by Vehicle Engineering will be presented for update and closure at the Prelaunch Mission Management Team review.

Shuttle Processing

The auxiliary power unit confidence run (hot fire) was successfully completed. Environmental control and life support system oxygen decay test, payload video quality test, and booster integrated electronics assembly cable connector inspections were considered unplanned processing tasks. Cable replacement in response to the STS-112 pyrotechnic system failure was consistent with the STS-113 action plan. A waiver to perform a hydraulic leak test at 500 pounds per square inch (psi) instead of the required 3,000 psi was approved to avoid reconfiguring the vehicle. An exception accepted the faster-than-specification retract time of the orbiter access arm. An exception to a recently failed Criticality 3 micro-strain gauge will be requested at the daily Program Requirements Change Board.

Eastern Range

Launch schedules and Range assets/support were discussed.

Safety, Reliability and Quality Assurance

Significant assessments have been performed on the OV-103 BSTRA crack, defective booster connector pin, booster separation motor propellant paint chip contamination, and STS-113 main engine #1 nozzle leak.

Action Items

No actions were assigned.

Exceptions

There was one Space Shuttle Program certificate of flight readiness (CoFR) exception: A crack was found on the OV-103 17-inch feedline BSTRA ball. Testing is currently underway to prove that cracks of this type will not continue to grow, will not interfere with joint angulation, and will not produce foreign object debris. Estimated completion of all testing is January 15, 2003. The exception will be closed with final flight rationale at the STS-107 Prelaunch Mission Management Team meeting.

Mr. Readdy polled the principal managers and organizations; all responded ready to support the STS-107 mission.



Linda J. Ham
Acting Manager, Launch Integration

2 Enclosures:

1. Agenda
2. Exception Log

STS-107
Flight Readiness Review
January 9, 2003

Agenda

Introduction	Manager, Launch Integration
Mission Operations	Director, Mission Operations APM, Flight Operations, SFOC
EVA	Manager, EVA Project
Flight Crew	Director, Flight Crew Operations
Space and Life Sciences	Director, Space and Life Sciences
Program Integration	Flight Manager Manager, Space Shuttle KSC Integration Manager, Space Shuttle Systems Integration Manager, Space Shuttle Customer and Flight Integration APM, Program Integration, SFOC
Payload Processing	Director of ISS/Payloads Processing
External Tank	Manager, External Tank Project
RSRM	Manager, Reusable Solid Rocket Motor Project
SRB	Manager, Solid Rocket Booster Project APM, SRB Element, SFOC
SSME	Manager, Space Shuttle Main Engine Project
Vehicle Engineering	Manager, Space Shuttle Vehicle Engineering APM, Orbiter Element, SFOC APM, Flight Software, SFOC APM, FCE/EVA, SFOC
Ferry Readiness	Ferry Operations Manager
Shuttle Processing	Director of Shuttle Processing APM, Ground Operations, SFOC APM, Integrated Logistics, SFOC
Range	United States Air Force
DDMS	Director, DDMS
Space Shuttle SR&QA	Manager, Safety, Reliability and Quality Assurance
Exception/Action Summaries	Manager, Launch Integration
Readiness Poll	Associate Administrator, Office of Space Flight

<div> <div>CoFR EXCEPTION LOG</div> <div> <div>CoFR REVIEW DATE: 01-09-03</div> <div>STS FLT NO. STS-107</div> </div> </div>				<div>DUE DATE</div> <div>STS-107 PMMT</div>
REQUIREMENT/ EXCEPTION NUMBER	ELEMENT	DESCRIPTION OF EXCEPTION		
001	ORBITER	<p>NSTS 08117 PARAGRAPH 8.5.18.1 AA. ALL ANOMALIES THAT POTENTIALLY IMPACT PROCESSING, LAUNCH, MISSION SUCCESS, OR LANDING HAVE BEEN REPORTED AND SUCCESSFULLY RESOLVED WITH NASA.</p> <p>THE OV-103 LO2 17" FEEDLINE BALL STRUT TIE ROD ASSEMBLY (BSTRA) WAS FOUND TO BE CRACKED. TESTING IS CURRENTLY UNDERWAY TO PROVE THAT CRACKS OF THIS TYPE WILL NOT CONTINUE TO GROW, WILL NOT INTERFERE WITH JOINT ANGULATION, AND WILL NOT PRODUCE FOD. ESTIMATED COMPLETION OF ALL TESTING IS 1/15/03. ORBITER WILL REPORT STATUS/RESOLUTION OF THIS ISSUE TO THE STS-107 PMMT.</p>		